# Pre-Symposium Tutorials & Workshops

## Noise and Air Quality Tradeoffs

Presented to: 22nd Annual UC Symposium on Aviation Noise and Air Quality

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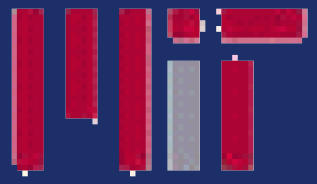
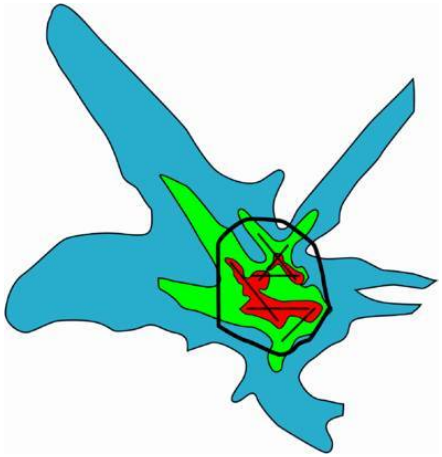
Date: March 4, 2007



# Aviation Environmental Issues

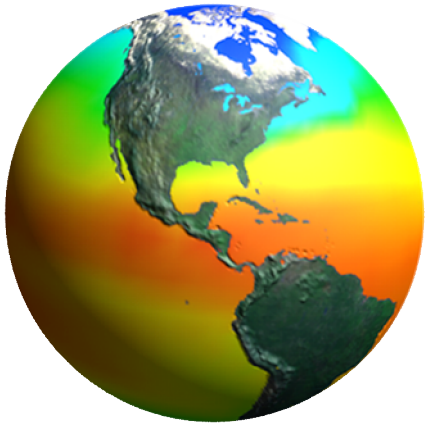


## Community Noise Impacts

Limiting or reducing significant aircraft noise impacts around airports

## Water Quality

Limiting or reducing impact of aviation on water quality



## Global climate

Understanding and addressing impact of aviation on global climate

## Air Quality

Limiting or reducing impact of aviation on local air quality

# Stovepipes

- Great progress reducing environmental impact of aviation

- However – despite interrelationships between noise and emissions and amongst emissions, these environmental impacts addressed in "stove pipes"

# Why Integrate Noise and Emissions? …

- DOT 2004 R&D Annual Review

  *"Ensure aviation remains a good neighbor."*

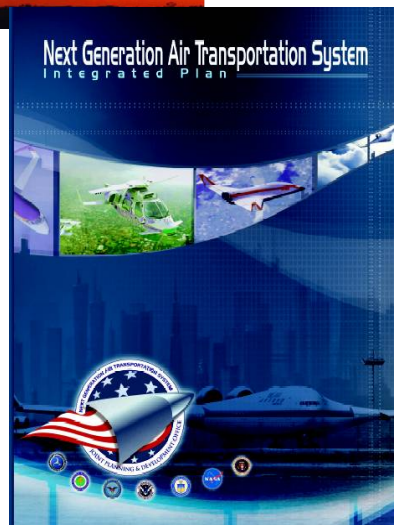
- FAA 2005-2009 Flight Plan

  (http://www1.faa.gov/aboutfaa/flightplan.cfm)

  *"Develop better technologies and analytical tools to evaluate aircraft noise and emissions."*


- Joint Planning and Development Office
- Next Generation Air Transportation System

  *"Create new analytical tools to understand better the relationship between noise and emissions, the different types of emissions, and the costs and benefits of different policies and actions"*



# Why Integrate Noise and Emissions? …

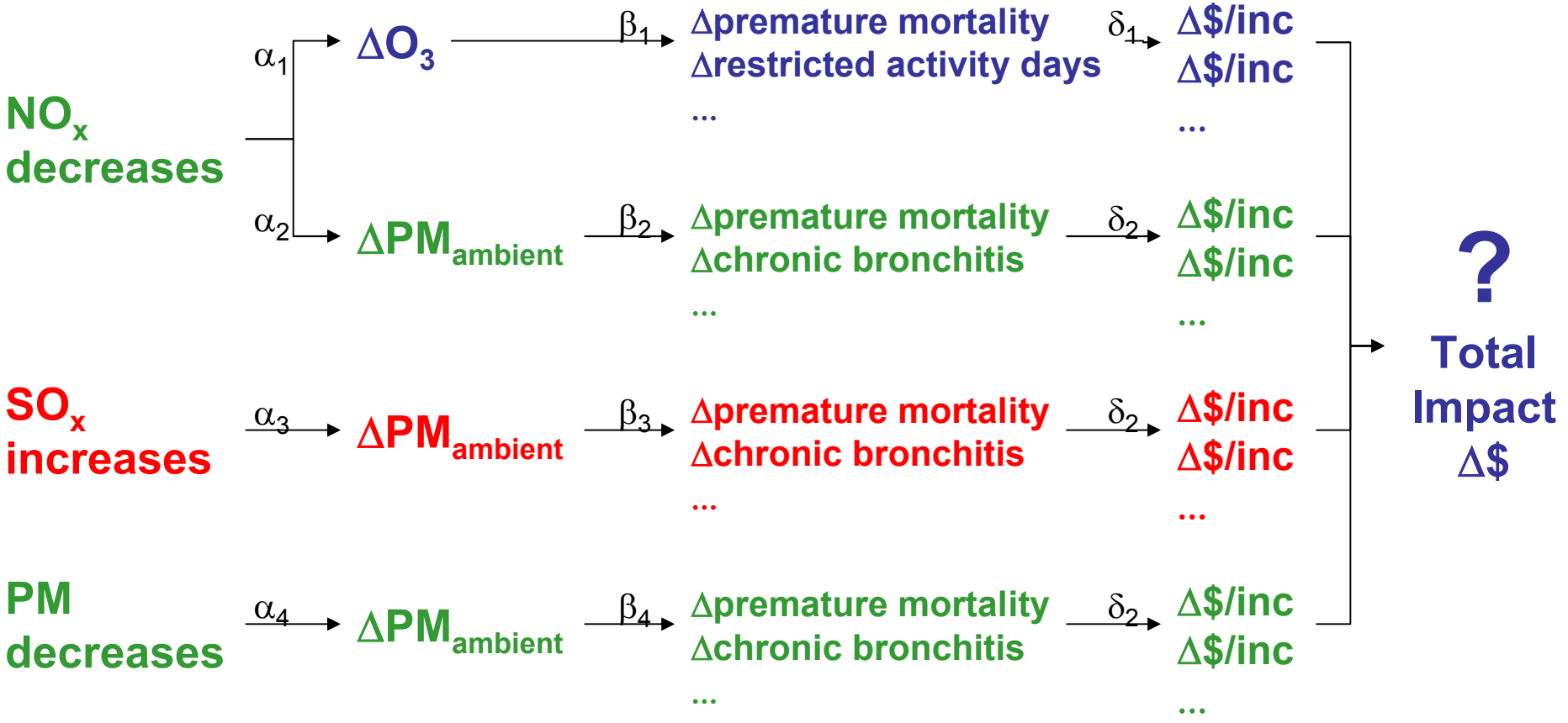
- Better use of R&D funds
  - Single Graphical User Interface (GUI) to maintain
  - Common set of modules/databases to maintain
- More efficient analyses at local level
- Consistent analyses – domestic/global policy-making vs. local analysis
- Noise and emissions interdependencies …

# Why Integrate Noise and Emissions? …

***Even simple changes may lead to complex trade-offs, for example…***

- **One aspect of airplane operations changed**
  - Throttle setting reduced during take-off
- **Emissions and noise change**
  - **$CO_2$ increases**
  - **$NO_x$ decreases**
  - **$SO_x$ increases**
  - **PM decreases**
  - **Noise decreases**
- **Also affects aviation economics**

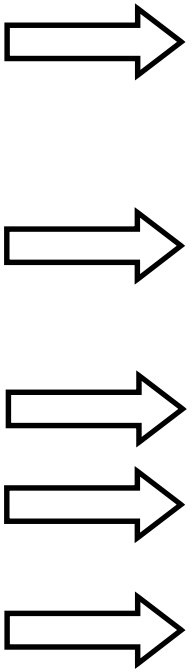
# Even for emissions only, tradeoffs are complex …




***Local air quality and climate response cannot be determined simply from observing changes in inventories***

# Legacy/Regulatory Stovepipes

| Modeling Tool | Existing FAA Regulatory Obligations |
|---|---|
| EDMS | • CAEP Requirements<br>• Clean Air Act<br>• NEPA<br>• State Implementation Plan (SIP) Development |
| INM | • CAEP Requirements<br>• Part 150 and Part 161<br>• NEPA<br>• Grand Canyon Overflight Act<br>• Air Tour Management Act of 2000 |
| NIRS | • NEPA (Broad Area Air Traffic Re-designs) |
| MAGENTA | • CAEP Requirements<br>• DOT Noise Performance Goal |
| SAGE | • CAEP Requirements<br>• FAA Flight Plan Emissions Goal<br>• United Nations Framework Convention on Climate Change (UNFCCC) |



*legacy stove-pipes*

*CAEP - International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection*

*MAGENTA - Model for Assessing Global Exposure form Noise of Transport Airplanes*

*NEPA - National Environmental Policy Act of 1969*

*NIRS - Noise Integrated Routing System*

*INM – Integrated Noise Model*

*EDMS – Emissions and Dispersion Modeling System*

*SAGE – System for assessing Aviation's Global Emissions*

# What the current environmental tools look like

- **Local models**
  - Emissions and Dispersion Modeling System (EDMS) - air quality
  - Integrated Noise Model (INM) - noise

*Regulatory Use*

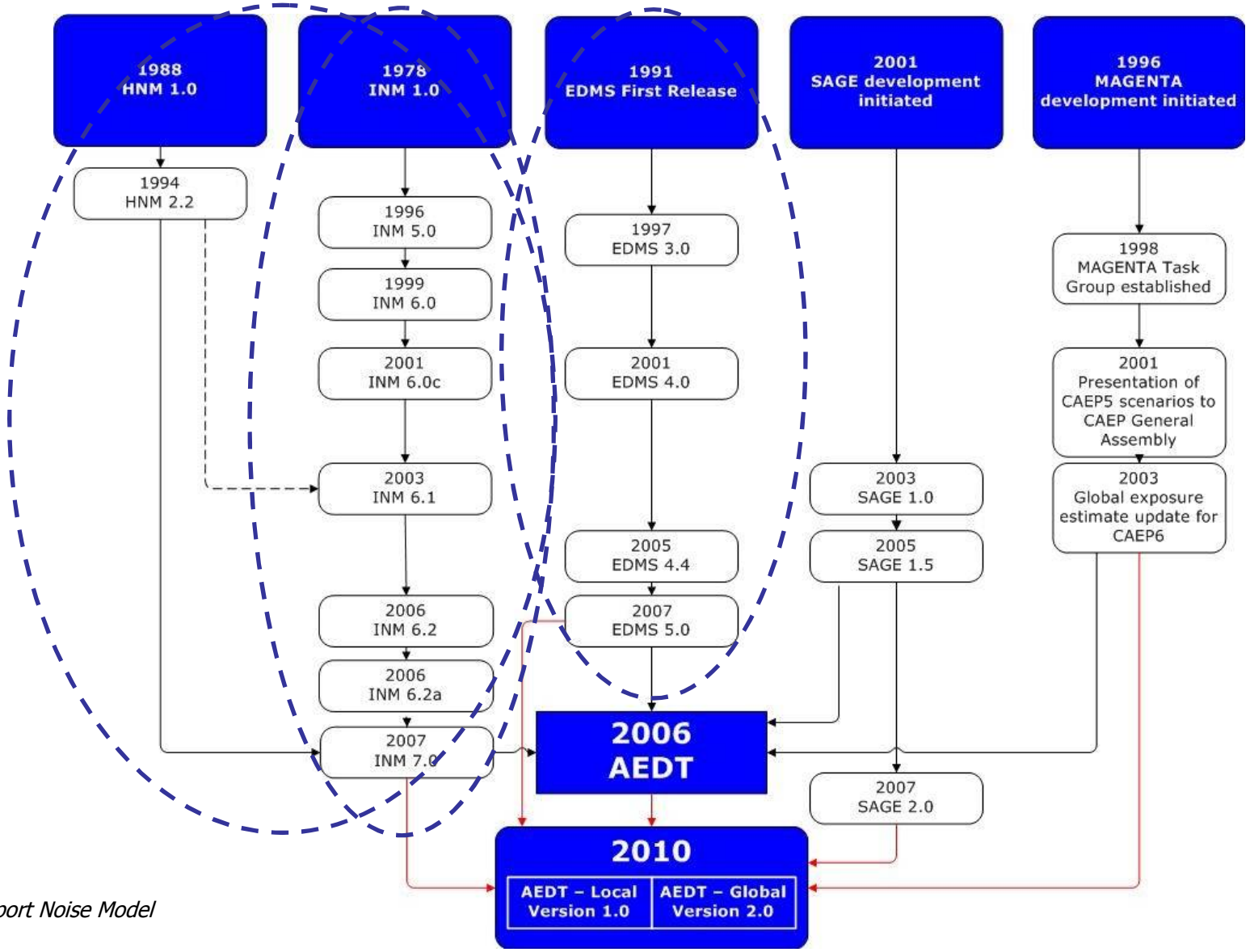
- **Regional model**
  - Noise Integrated Routing System (NIRS) - noise

*Airspace Design*

- **Global models**
  - Model for Assessing Global Exposure to the Noise of Transport Aircraft (MAGENTA) - noise
  - System for assessing Aviation's Global Emissions (SAGE) - emissions

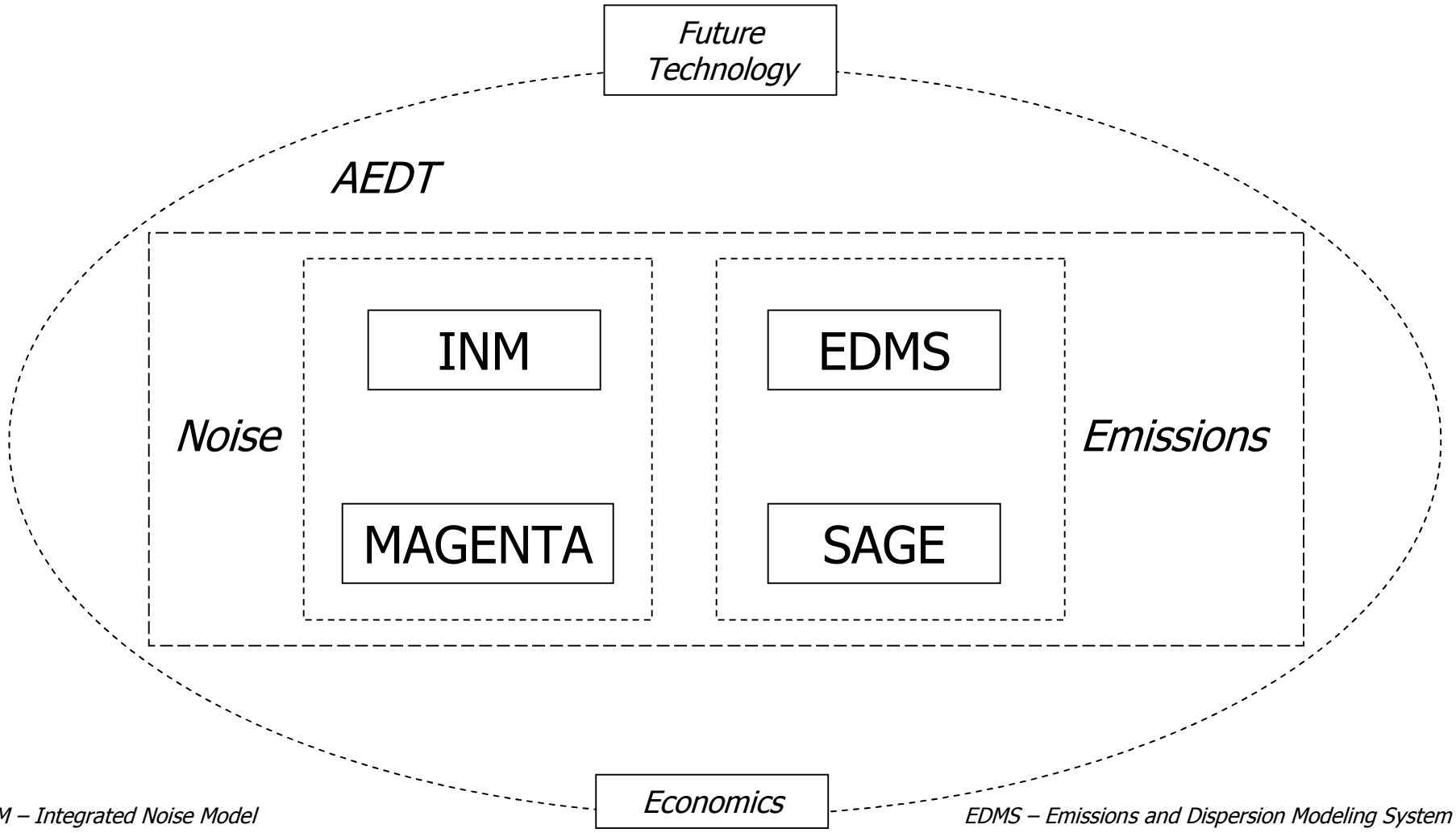
*Policy Analysis*

# What the current environmental tools look like …




*HNM – Heliport Noise Model*

# What the proposed environmental tools look like




*INM – Integrated Noise Model*

*EDS – Environmental Design Space = "Future Technology"*

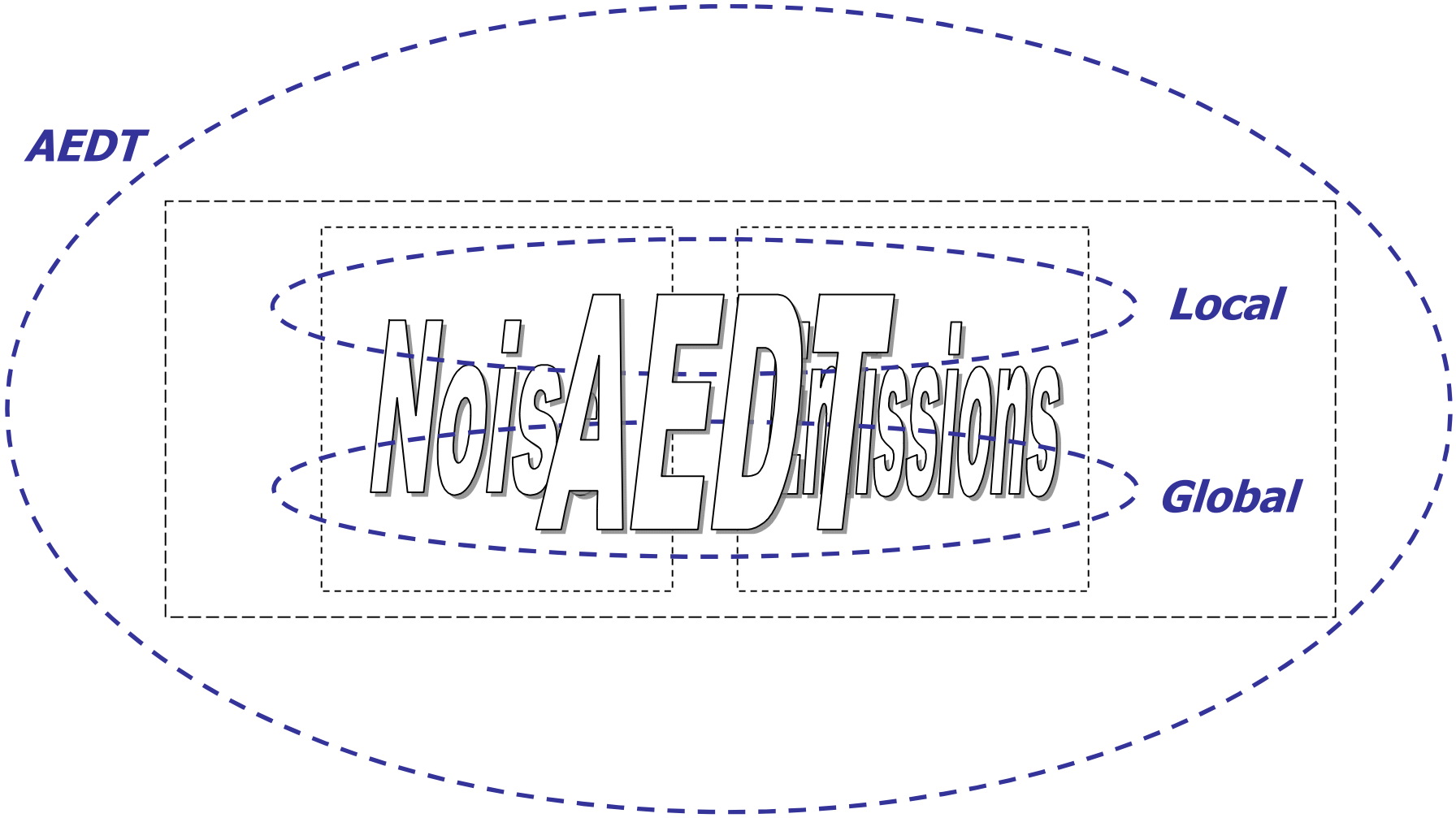
*MAGENTA - Model for Assessing Global Exposure form Noise of Transport Airplanes*

*EDMS – Emissions and Dispersion Modeling System*

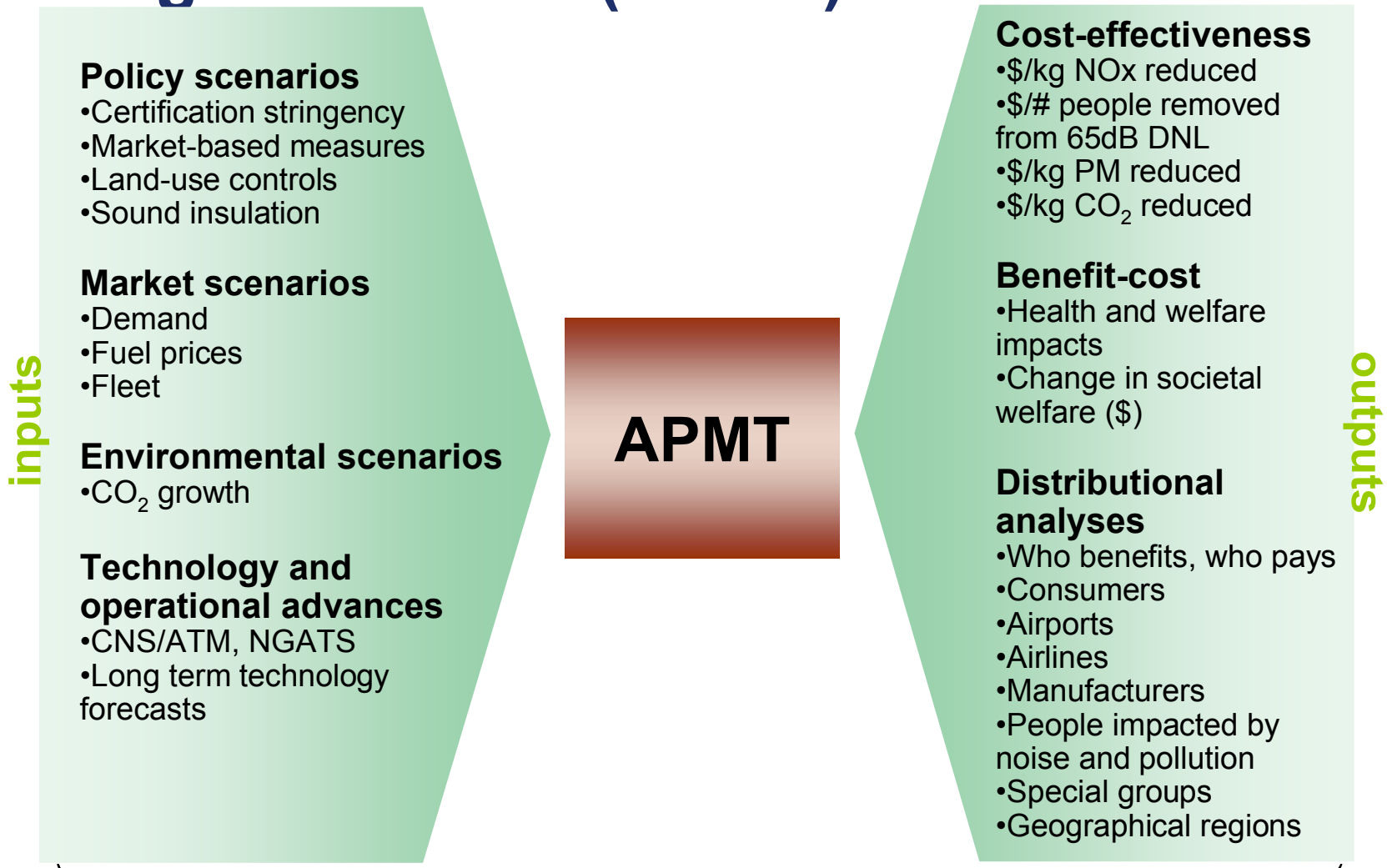
*SAGE – System for assessing Aviation's Global Emissions*

*APMT – Aircraft Portfolio Management Tool = "Economics"*

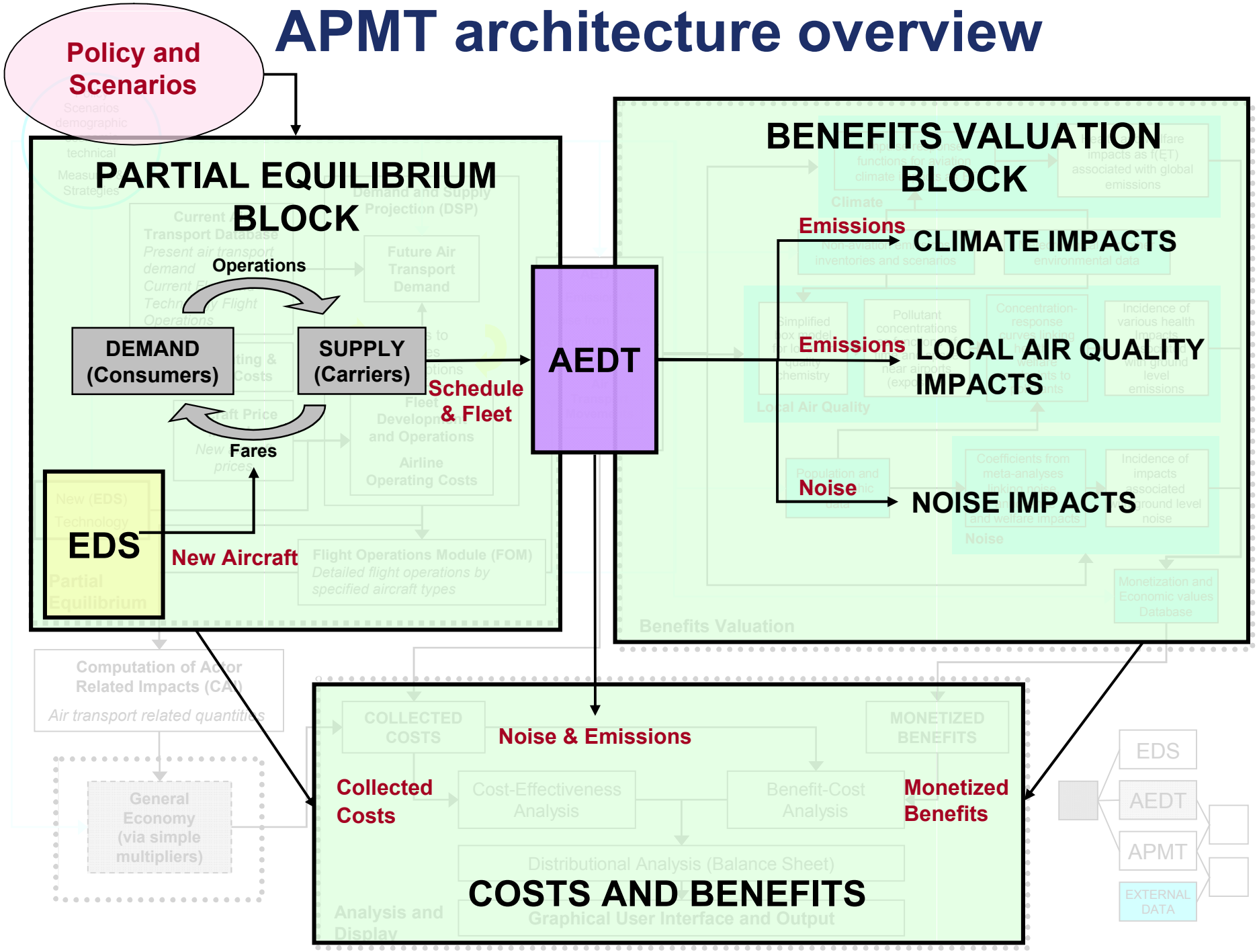
# What the proposed environmental tools look like



# Aviation Environmental Portfolio Management Tool (APMT)



# APMT architecture overview



# Outcomes

- **Integrated aviation environmental analyses:**
  - Interdisciplinary tools to support interrelationships among emissions, noise and economics
  - Improved Government policies and decisions
  - Better industry understanding
  - Better informed public

# ??? Questions ???

FAA Environmental Tools web site:

http://www.faa.gov/about/office_org/headquarters_offices/aep/models/